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Research Trends In Dissertations On PBL: A Content Analysis Study

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Abstract

Problem-based learning as an educational practice continues to have large impacts on all levels of education and across different disciplines. The aim of this study is to investigate the research trends in studies of problem-based learning (PBL) from 2002 to 2013 in Turkey. For this purpose, the master's and doctoral dissertations in the National Thesis Database of Council of Higher Education (CoHE) were selected for rigorous content analysis. The analysis was utilized to classify the type of study, the learning domains, research designs, research domains, subject groups, group sizes, and length of treatments. For analysis purposes, frequencies and percentages were calculated for each category. According to analysis results, science is the most favorable learning domain, quantitative design is more utilized as compared to qualitative and quantitative design, cognition and affect followed by cognition only are the mostly utilized research domains, subject groups are predominantly at elementary education level and secondly from teacher education, studies preferred to have a group size of 41-80, and finally the experimental treatments on PBL research last mostly 4 weeks and 6 weeks.

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Keywords: Problem-based learning; content analysis; research trend; PBL dissertations

1. Introduction

Problem-based learning (PBL) is a student-centered, inquiry-based approach, which has its roots in constructivist epistemology (Savery & Duffy, 1995), and begins with an ill-structured problem with possible multiple solutions. Teachers are facilitators, whereas learners actively construct knowledge by defining learning goals, seeking

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information to build upon prior knowledge, reflecting on the learning process, and participating actively in cooperative/collaborative learning groups (Barrows, 1996, 1998; Hmelo-Silver, 2004). Barrows (1986) identifies the following objectives of problem-based learning:

- Structuring of knowledge for use in clinical contexts,
- The development of an effective clinical reasoning process,
- The development of effective self-directed learning (SDL) skills,
- Increased motivation for learning (p. 481-482).

Among the educational objectives listed above, it is clear that Barrows implies PBL's promotion of learning outcomes in the cognitive, affective, and conative domains. The references to cognitive, affective, and conative domains of learning above presents PBL's potential to promote not only what is learned, but also put emphasis on feelings on what is learned and the learning experience itself, together with willingness and desire to learn.

Furthermore, literature review on PBL studies suggests that the majority of problem-based learning research and practice is in higher education, specifically medical education; but recently more research has been published in different disciplines and levels (Savery, 2006; Walker & Leary, 2009). Outside Turkey, many meta-analyses and reviews (Albanese & Mitchell, 1993; Berkson, 1993; Colliver, 2000; Dochy, Segers, Van den Bossche, & Gijbels, 2003; Gijbels, Dochy, Van den Bossche, & Segers, 2005; Kalaian, Mullan & Kasim, 1999; Leary, 2012; Loyens, Magda & Rikers, 2008; Vernon & Blake, 1993; Walker & Leary, 2009) have been conducted to analyze the effectiveness of problem-based learning. The only meta-analysis on PBL research in Turkey, which could be accessed by the author as of March 2014, belongs to Ustun (2012). It is quite obvious that more review studies are needed to analyze PBL's appropriateness, its application and practices, its strengths and weaknesses, and its potential influence on today's education (Strobel & van Barneveld, 2009), specifically in Turkey. Besides, as more disciplines and educational settings (e.g. elementary education, higher education) began experimenting with PBL, it became necessary to review the outcomes reported in these studies.

Therefore, reviewing the research trends in problem-based learning studies may help the researchers in related fields to identify their research interests and designs. Besides, the study will also provide educational policymakers with a reference to make plans in the future.

This study intends to investigate the research trends in studies of problem-based learning from 2002 to 2013 in Turkey. For this particular purpose, the master's and doctorate dissertations in the National Thesis Database of Council of Higher Education (CoHE) were selected for analysis. The research question addressed by this paper is:

"What type of studies, learning domains, research designs, research domains, subject groups, group sizes, and length of treatments were used in the selected theses from 2002 to 2013?"

2. Method

This paper examines dissertations related to problem-based learning in the National Thesis Database of Council of Higher Education (CoHE). For this purpose, the master's and doctoral dissertations were searched by using "problem-based learning" as a keyword with no time restrictions. At the end of the filtering process, 59 dissertations (41 master's, 18 doctorate), which only utilized *experimental design in classroom settings* were included in the study. They were all downloaded from the database and undergone rigorous content analysis.

Content analysis was chosen as a qualitative method to investigate the research trends in research. Content analysis is defined by Krippendorff (2004, p. 18) as "... a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use." As Krippendorff states it, content analysis is learnable and divorceable from the personal authority of the researcher and it "provides new insights, increases a researcher's understanding of particular phenomena, or informs practical actions" (p. 18). Therefore, the author preferred this scientific tool to investigate research trends in dissertations in order to inform practitioners, faculty, and policymakers of PBL's practical actions and considerations.

The reason for including only those dissertations with experimental designs lies in the strength of these models to explain outcomes (*casualty*), whether confirmatory or exploratory, to discover the effects of certain variables (Cohen, Manion & Morrison, 2007, p. 272). The author believes that much healthier results about PBL's influence could be attained by reviewing those experimental studies, where variables are isolated or controlled carefully by the researchers.

2.1. Data coding and analysis

This study used 59 experimental design dissertations derived from the Council of Higher Education National Thesis Database that were completed from 2002 to 2013 (with the exclusion of non-publishing years of 2003 and 2005) to examine the research trends in the PBL field. Content analysis was utilized to classify the type of study, the learning domains, research designs, research domains, subject groups, group sizes, and length of treatments. Throughout the process, three colleagues with at least master's degree helped the author in reviewing the dissertations and doing the analyses.

As one of the major purposes of this study, a framework was developed by the author and assisting colleagues to classify the categories to help identify the research trends from 2002-2013. A dissertation classification form (DCF) was developed exclusively for the purpose of this study. This form was inspired from a previously developed "paper classification form" of Sozbilir and Kutu (2008). After examined by colleagues and experts, the form was implemented on randomly selected 15 dissertations for reliability. The results of this initial trial were discussed to alleviate any disagreements on the items. According to discussions and negotiations, the form was revised again and its final version was agreed upon to be used for comprehensive content analysis.

For the analysis purposes, by means of the dissertation classification form, all data were recorded on an electronic database and later transferred to SPSS 20. Frequencies and percentages were calculated for each category and sub-category. These data were later commented and discussed.

3. Results

The findings and results considering each category in question are given separately below.

3.1. Type of Study

As presented in Table 1, among the 59 studies examined in this research, 41 were master's and 18 were doctoral studies. The studies on PBL reached their peak through the period from 2007 to 2011, with the highest number of research done in the year of 2011.

Table 1. Frequencies of Study Types from 2002-2013

Year	Type of Study		Grand Total	Percentage (%)
	Master's	PhD		
2002		1	1	1.7
2004	1	1	2	3.4
2006	2	2	4	6.8
2007	5	3	8	13.6
2008	5	2	7	11.9
2009	6	2	8	13.6
2010	8	1	9	15.3
2011	9	1	10	16.9
2012	3	3	6	10.2
2013	2	2	4	6.8
Grand Total	41	18	59	100

3.2. Learning Domain

Table 2. Frequencies of Learning Domains from 2002-2013

Year	Learning Domains			
	Arts	Language Arts	Science	Social
2002				1
2004			1	1
2006			3	1
2007			8	
2008	1		4	2
2009			7	1
2010			9	
2011	1	1	7	1
2012		1	5	
2013			4	
Grand Total	2	2	48	7

Table 2 reveals that PBL research was most frequently utilized in science domain (81.4%), whereas there were only 2 studies in the domains of language arts and arts.

3.3. Research Design

Table 3. Frequencies of Research Designs Utilized from 2002-2013

Year	Research Design	
	Quantitative	Quantitative and Qualitative
2002	1	
2004	1	1
2006	1	3
2007	6	2
2008	6	1
2009	4	4
2010	5	4
2011	6	4
2012	2	4
2013	2	2
Grand Total	34	25

The findings on research design show that quantitative design is more utilized as compared to qualitative and quantitative design (mixed design) (Table 3).

3.4. Research Domain

Table 4 shows the research domain focused in studies from 2002-2013. The most frequently focused research domain was cognition and affect (61%), followed by cognition only (22%).

Table 4. Frequencies of Research Domains Focused in Research from 2002-2013

Year	Research Domain				
	Affect	Cognition	Cognition and Affect	Cognition and Conation	Cognition, Affect and Conation
2002			1		
2004		1			1
2006			3		1
2007		3	3	1	1
2008	1		6		
2009		2	6		
2010		1	7		1
2011	1	5	4		
2012			4		2
2013		1	2	1	
Grand Total	2	13	36	2	6

3.5. Subject Group

As illustrated in Table 5, the most frequently used subject groups in the experimental studies were elementary education students (54.2%), followed by teacher education students (30.5%).

Table 5. Frequencies of Subject Group in Research from 2002-2013

Year	Subject Group			
	Elementary Education	Higher Education	Secondary Education	Teacher Education
2002	1			
2004		1	1	
2006	2		1	1
2007	4		1	3
2008	3		2	2
2009	5			3
2010	4	1	1	3
2011	7		1	2
2012	3			3
2013	3			1
Grand Total	32	2	7	18

3.6. Group Size

As can be seen in Table 6, the studies on PBL preferred to have group sizes of 41-80 (67.8%), whereas the number of studies which used 81-120, 1-40, and 120 and above were 9 (15.3%), 6 (10.2%), and 4 (6.8%), respectively.

Table 6. Frequencies of Group Sizes Utilized in Research from 2002-2013

Year	Group Size			
	1-40	41-80	81- 120	121 and above
2002		1		
2004		2		
2006		3	1	
2007	1	3	2	2
2008	2	3	2	
2009		6	1	1
2010		9		
2011	1	8	1	
2012	1	3	1	1
2013	1	2	1	
Grand Total	6	40	9	4

3.7. Length of Treatments

Table 7. Frequencies of Length of Treatments in Research from 2002-2013

Year	Length of Treatment										
	7 hours	3 weeks	4 weeks	5 weeks	6 weeks	7 weeks	8 weeks	9 weeks	10 weeks	12 weeks	14 weeks
2002						1					
2004					1					1	
2006			1		2						1
2007			2	3	2				1		
2008			3		1			1			2
2009		1	3	1	1			1	1		
2010	1	1		2	2		2	1			
2011		2	4		1	1	1	1			
2012			1		1	1	1	1			1
2013		1				1	1			1	
Grand Total	1	5	14	6	11	4	5	5	2	2	4

Considering the lengths of treatments used from 2002 to 2013, it is quite clear from Table 7 that the experimental treatments on PBL research lasted mostly in 4 weeks (23.7%) and 6 weeks (18.6%).

4. Discussion

This study aims to investigate the research trends in studies of problem-based learning (PBL) from 2002 to 2013 in Turkey. The results of the findings are discussed and commented below.

The content analysis of master's and doctoral dissertations shows that the number of studies on PBL is the highest during the period of 2007-2011 (see Table 1). Considering the analyses results of other categories under focus, this study indicates that; science is the most favorable learning domain (see Table 2), quantitative design is more utilized as compared to qualitative and quantitative design (mixed design) (see Table 3), cognition and affect followed by cognition only are the mostly utilized research domains (see Table 4), subject groups are predominantly at elementary education level and secondly from teacher education (see Table 5), studies prefer to have the subject group size of 41-80 (see Table 6), and finally the experimental treatments on PBL research last mostly 4 weeks and

6 weeks (see Table 7).

These analysis results reveal evidence on several research trends. First, studies generally focus on PBL's effect on cognition and affect. Second, there is an increase in the utilization of both quantitative and qualitative designs together. Third, studies at elementary education and teacher education are on the rise. Fourth, it is obvious that science is and potentially will continue being the dominant learning domain in PBL research. Finally, the highly frequent use of 4-week and 6-week treatments, together with sudden increase of 3-week and 8-week treatments suggest that researchers' preferences in majority range from 3 to 8 weeks.

5. Conclusion

The present study examined the research trends in studies of problem-based learning from 2002 to 2013 in Turkey. For this purpose, 59 master's and doctoral dissertations, in which experimental design was utilized, underwent rigorous content analysis. The analysis was used to classify the learning domains, research designs, research domains, subject groups, group sizes, and length of treatments in these dissertations. Frequencies and percentages were calculated for each category and additionally the findings of those dissertations were examined regarding PBL's influence on cognitive, affective, and conative elements. In summary, this study suggests some research trends in PBL dissertations through years.

Problem-based learning as educational practice continues to have large impacts on all levels of education and across different disciplines. While the results of studies examining the effects of PBL seem to be conclusive regarding students' problem-solving abilities, attitudes and predispositions towards learning, and clinical or occupational skills in application, much more needs to be known about PBL's influence on the acquisition of basic knowledge and some conative elements like self-direction/self-regulation.

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